

Colbert Cushing Interview

Vince Resh: What made you want to go into aquatic ecology or stream ecology?

Bert Cushing: Well, on one hand, it's easy. On the other hand, it's strange, because my dad was an educator. He was in the University of Denver when I was making that big decision, "What am I going to do in college?" And he kept pushing me, "What're you going to do? Maybe we could go do some aptitude testing out here to see what you can do." Because quite frankly, I was a little torn as to what I wanted to do. The outdoors always had an attraction and most of that, of course, was through fly fishing. My dad started me at it about ten years of age. But then a great passion I always had was athletics. As little as I am, basketball was my favorite. And I thought hard of going into coaching, but I finally decided that if you didn't play the game, you weren't going to make it, probably, and I knew I couldn't do that in college. My love of fishing and so forth, well, fishery biology and that sort of field sounded like a good way to go. So I headed up at Colorado State where they had fishery and wildlife school. And even through my freshman year, I admit, I still harbored doubts. At that time, between your freshman and sophomore year, you had to go to a twelve week forestry camp, where you spent time on map-making, dendrology, silviculture, all these things, and two weeks of wildlife management, of which only one week was fisheries. So here's one out of twelve weeks in your field of interest. Before this camp, I said to myself, "I'll go to forestry camp. If I don't like it, I'm going to come back and change to phys ed." I didn't like it and I still didn't change. I mean, let's face it. I went out for twelve weeks, learning how to identify trees and timber cutting just didn't have it. But I stayed in it and I'm glad I did. So I'd always looked for a career in fisheries biology. Colorado Game and Fish Department seemed about then to be my main goal. Of course, the Korean War broke out just before I graduated and I ended up going into the service, always with the idea of coming back to do a Master's. Before that happened, and during my undergraduate, we also had to take a course in limnology. This really hit me. Not only the subject matter of more than just the fish, but the whole aquatic environment. It really turned me on. That plus the instructor, who was Doctor John Olive, now deceased. He was such a great teacher and the course was so that I knew that's where I was going to come back and do my masters. And I did. So, after the service I came back and I took my Master's in limnology. Even at that time, finding a position with research was pretty tough. But I did get an offer from the Montana Game and Fish Department to become a research fisher and biologist. This sounded pretty good. At that time, Montana was separated into seven districts with a Fish Manager in each district, charged with doing the normal fishery biology things: managing people and fish, trying to keep everyone happy. I was the first outside biologist Montana hired to become a two-man team in a district. I went to Kaysville and my title was Research Fishery Biologist. Well, that was a real misnomering. It could have been Highschool Technician for all the research we did. I spent half my life, I swear, mending gill net holes. It took about two and a half years for me to realize this wasn't what I wanted at all. So I started looking around for anything in research I could find. Said PhD. You had to have the meal ticket. Many years before, the first technical meeting I went to, the 1955 AIBS at Michigan State, I remember. Doctor Oliv introduced me to Doctor Donald Rawson was the leading limnologist in Canada.

VR [4: 54]: The Rawson Academy.

BC: Yeah. It's been named after him. At that time, in this little dorm room at Michigan State, Dr. Rawson said, "You know, if you're ever thinking about coming back to school, let me know." This is strange from a first meeting from an icon type. But, when I decided to go back to school and I got out of Montana, it really turned out two things: I was too late for most of the scholarships that were available. I decided too late in the year. But after writing a lot of letters, I was actually accepted at Michigan State. I don't know how many of you know this. I was accepted at Michigan State. I had the ticket to admit me to Registration and everything and I never talked to one person live. That really kind of got me bomb all I knew, and that's where I sent my first letter. But from then on it was just rubber stamp, "Here's the form", "You're in." And that kind of turned me off. So I wrote to Dr. Rawson and he offered me an assistantship right off the bat, so that's how I ended up at Saskatoon. During the time in Montana, when I really got interested in streams, merely by being in a lot of them. Not a chance to do research, but I knew I wanted to do my PhD in something to do with streams. So, that's where I ended up. Now, that's sort of from start to where I ended up getting my PhD.

VR [6:36]: What did the influence have of Colorado State, of Montana, and of Saskatoon, and then, of course, when you went to Battellel. Being in these different environments, how did it effect how you viewed streams?

BC: Well, quite honestly, I didn't get a lot of exposure to what you would call stream ecology until I got up to Saskatoon. Colorado State, my Master's had to do with a toxicity study in lakes. I didn't work in streams then. As I say, I really got turned on to streams just on my own, not in any formal education or formal training in that direction. Every place you go you get a different perception of things. I like to tell a story about in Colorado, in ornithology. We were introduced to this bird out in the meadows and it had a yellow head. A yellow headed blackbird. I got to Montana and I learned they called it a black-assed yellowbird. So I like to use that as a way. You get a different perspective in different places. So, really, I first started getting really interested in streams when I went up to Canada.

VR [7:52]: How did you go to Battellel?

BC: Battellel. It's an interesting story. When I came back from the service to get my Master's. Let me go back a little further. When I was getting my undergraduate's Fisheries degree, there was even a degree in Fish Management when we started. In our sophomore year, they introduced a Fisheries major. And there were four of us, then, that continued on and we were the first four Fisheries graduates from Colorado State. Two of them never followed the field. The second one, Dale Hoffman, and I came back from the service to get our Master's. At that time, we didn't have a subject and Dr. Olive found us a real neat project we could work on together. So, Dale and I were the only two that followed in the field. While I was in Montana, after I got my Bachelor's, I was encouraged by an acarologist into my PhD. Colorado State...

VR [9:02]: In entomology?

BC: Acarology. Yeah. Tyler Woolley. Best teacher I ever had in any school. Anyway, I said, "No, I want to get my feet wet in the world. I'm not ready to go right back and get a PhD. I want it to be in something I know I'm going to be interested in." Dale, in turn, stayed to CSU to get his doctorate. While I was up at Montana in Fisheries, for a summer job, Dale went up and worked in the Hanford biology labs. Hanford, Battelle, all this is the Hanford Nuclear Reservation. GE ran everything when I first went there and then Battelle finally took the labs. So, to get that straight. Anyway, Dale went up there, and we, of course, corresponded a lot and he said, "This is a pretty fascinating place. You know, they're doing all this stuff with radioisotopes and artificial streams and it's just really cool. This guy named Jerry Davis is my boss. He kind of got me pretty interested in this." And it just happened that while I was at Kalispell, it turned out that Jerry Davis came over to give a seminar at the Flathead station, which is just down the shore from Kalispell. So I hopped in my car and went down to hear this and it was just fascinating that they traced the radionuclides in the Columbia River to... And it just seemed like, "Man, there's a field of research that's going to open a lot of things. Just because you can make such tiny amounts of all these things." So I'd always kept this in mind and when it was time to get a job and I was finishing my PhD, I wrote to Jerry. I also wrote to Stan Auerbach at Oakridge. That was a second site that a lot of radioecology work was being done. Jerry offered me a job there, which I took. Interesting this was, about six months later I got a letter from Stan saying, "Are you still interested in the job down here?" I thought that was dead. Somehow we lost correspondence. So I went to work for General Electric in the biology labs, which became Battelle. That's how I ended up down there with...

VR [11:34]: You were there for thirty years?

BC: '61 to '96, thirty-five years.

VR [11:41]: Thirty-five years. Wow. How did you get involved in the River Continuum project?

BC: That's Sedell. I'll say it directly because he made the first call. As we reviewed yesterday and talked about it, I'd met Wayne and I'd met Ken by then. We'd corresponded in common things and streams, but it was a phone call from Sedell saying, "Can you come to Gull Lake. A bunch of us want to get together and develop a stream focus group endeavor. Would you come?" That was how I got involved.

VR [12:23]: When you were doing the River Continuum work, was that the main focus of your research or did you have a lot of other projects and duties you had to do at Battelle?

BC: Actually, on a percentage basis, the Continuum was probably less than ten or fifteen percent of my support. Realize here (and I'd like to be on tape) is that, as we said yesterday, we started out looking for something that the five of us could do at our sites

and our streams. What eventually shook out didn't include Hanford. The Columbia couldn't be a continuum. The first order desert streams that went back to desert wouldn't work. The Yakima, essentially duplicated, Wayne's. So, right then, they could've dumped me. Really. But they wanted to stay together as a team and I appreciated that. It was an honor to work with that bunch of guys. I'll never have the stature as them (and I admit it) but it was great to be with them. As a result, my percentage of the pie was very small. In other words, here's four sites, here's the pie we've got to cut. So they cut it in about four big pieces and a little sliver. That's where I fit in. No, I had all kinds of other works that was due on the Columbia River and Rattlesnake Springs and other sites. And of course, the real biggie by then, were environmental impact statements. In fact, earlier, when I first started there, 100% of my funding was from the Department of Energy, the old AEC. And they funded all of our radioecology in the Columbia, Rattlesnake, whatever we did. Working on the pure aspects of stream was very foreign. I had to pirate a lot of that and then when the EIS business came along, they cut all of our research funds they said, "All you guys are going to do is write environmental impact statements for nuclear plants." So for several years, that was a good part of our business. I was an iconoclast, I didn't fit into Battelle. They wanted you to do contract research that sold something. And, to the day I left there, I didn't get very much support from Battelle, because bull-headedly I said, "I want to do pure research. I'm going to do it some way." It cost me. It cost me in the organization, but I did what I wanted to do.

VR [15:07]: Let me ask, in your opinion, what each of the members of the Continuum group contributed. What about Robin? What do you think his main idea was?

BC: The main idea. The concept. The base. And that practically says it all, because if we had never gotten that story line out, as I indicated yesterday. We did a lot of wheel spinning up until then. And it was almost, to me, like someone come up with something like this, it was almost like Robin got tired of hearing this and he says, "Look here." And he got up there at Stroud and started expounding and everybody's eyes open. Sedell says, "Here's the story." So Robin, that's the biggest thing. Everything else, he contributed a lot, but boy, that was it. That was the main thing.

VR [16:07]: How about Ken Cummins?

BC: Ken was just smart. He just knew his ecology. I can remember Ken would get frustrated at times with detail, and there was a lot of things that happened that...how do I say this diplomatically...one guy'd be leaning this way and another guy wouldn't quite like it that way. This happened in all of us, Ken too. But he contributed so much intellectually to it, that quite honestly, Wayne and Ken, to me, were the real intellectual stimulants. They were the guys that provided a lot of the detail. Jim was the big idea man. I mean, he could come up with an idea a minute.

VR: [17:00]: Let's talk about Jim. Go on, talk about him, please.

BC: Jim was an idea a minute, but we always liked to guess that, when we were writing papers, when we were doing things, when we were exchanging manuscripts, it was

always, "Did you ever get that from Sedell?" and "Did he ever send that back?" or "Did he ever send you that paper he promised" and most likely the answer was no. But what we came to learn, was that was almost a symptom of Oregon State. To this day, you (well, to the extent when I quit working) you just stay in, or anybody that seems in that bunch for a reprint or send something, it's just like pulling teeth. But Jim was great for ideas, keeping the bunch loose, getting back in focus if we'd drift. He was good at that. Very good.

VR [18:00]: How about Wayne?

BC: Wayne, without doubt the Continuum would never have succeeded without him. Once Robin gave us the idea, the show was essentially Wayne's in my book. He was the guy that made the papers go through, the logistics, it's just that simple. Robin gave us the idea. The rest of us fleshed out little different parts, and then it was almost like, it's Wayne's show. He was the Bear, we called him. He made it go. There's a lot of things I don't think it would've ever gotten done without Wayne.

VR [18:47]: And then of course, this is the most difficult. What do you think you brought as a contributor?

BC: I will not try to fool you. I brought less than I think anybody else on this team. And it was partly because the main reason I was involved at first was because, as Jim mentioned yesterday, the radio tracer aspect of it. And we thought there was going to be a place where radionuclides could answer a lot of questions with whatever we decided to do. Whether it's nutrient tracing or whatever, there was a whole aspect that I can bring that to it. Well, when that didn't enter into it, let's face it, that aspect gone, I had much less to bring than Wayne or Kim that had straight research careers in stream ecology where mine was more concentrated on the cycling of radionuclides in streams. But not so much of the total stream. So, quite honestly, I did do a lot in helping papers through. Wayne sent me lots of manuscripts to look at which the other guys just never returned. And then they also, during the first initial part of all the data collection, I was in charge of all the chemical tabulation in a bunch of this stuff. I brought some to it, but certainly on a scale of 1 to 5, I was definitely a 5.

VR [20:23]: Well, I think if you listen to the other contributions, you'll hear that you're underestimating what you did.

BC: Well, I hope so.

VR [20:31]: So, thank you. Now, do you think the people outside the Continuum...Do you think they realized what roles different people were playing, or did they view you as kind of this conglomerate?

BC: I had ups and downs with that. Quite honestly. I think, and I'm not trying to be egotistical here, I think my stature leading up to being elected president of NABS was built entirely on the Continuum and association with these guys and these relationships,

which says to me, we were viewed pretty highly as a team. I also know in my own heart, that somebody, maybe like Stuart who reviewed it during the program and was very close to it, they could see the major players and that I was kind of a helper with Wayne. So, I think there were some who could see it both ways. But the bigger school I think, saw us as a group.

VR [21:43]: Were there any ways or directions that you wished the Continuum went in, that they didn't go?

BC: Yeah, I wish they had gone for more work where I could've been more integral with the radionuclides expertise. I wish I could've contributed more. Surprising thing is, that came after the Continuum. When we wanted to get to this FPOM transport business, Wayne and I wrestled, the history of this is kind of interesting and it probably has been reviewed for it. We wanted to find a way to trace FPOM. We wrote a proposal to NSF and we said, essentially, "We want to develop a tracer. A way to trace particles. Ground-up walnut shells and this and that and then here's the research we're going to do." It got bounced because they said, "Don't come to us with a method development. Give us the research and don't worry so much about the tracer." So we re-wrote it, emphasizing the research. This one came back saying, "Don't give us the research until you know how you're going to do it." So it flunked twice for contrasting reasons. But just about that time, we ran into this paper of these guys in North Carolina. Wolfenbarger and Crosby and we found a way to label the tracer particles with C14. And there was our answer, right there. So after a lot of correspondence with them, we developed and proved we could do it. I was finally able to use radionuclides tracer technology as part of the Continuum. Yeah, if it wanted to go a different way, I wish there was a way to use that expertise more directly from the start. It just didn't happen and there are a lot of reasons.

VR [23:41]: There have been a lot of spin-offs of the River Continuum. Serial discContinuity Hypothesis comes to mind. They're modifications of the River Continuum concept. How did you feel about the fact that these came about with a name change?

BC: That didn't bother me at all, really. It said a couple things to me. 1: People were paying attention to what we did. 2: They thought enough of it to try to find a way to hang their own individual hat on it. And if it was by a little minor name change, so be it. The point was, in effect, they were honoring what we did. That it was worth following up on and looking at a different aspect of it than just trying to replicate the same thing in their streams. They were trying to say, "Hey, this is a neat concept. This is good stuff. How can we tweak it or look at it a little differently?" To me, that's a recognition of what you've done.

VR [24:46]: The River Continuum has been used in management and other research and testing hypotheses. Are you pleased with the way it's gone?

BC: By and large, yes. It's only when it's been taken almost as a negative and it's saying, "You can't fit things into a patterns like this for management purposes because we're

looking at discrete reaches and things like this, so don't give me this whole stream thing." So, that, in effect, that I haven't been involved enough in management to really probably answer this whole question for you, Vince. I guess another way to answer that is I'm not sure that management has yet recognized it for what it is and what it can do for them. I think it's still looked upon as theoretical and "Don't bother us with theory". Now I sound like Battelle. Pardon the sour grapes. In some ways it seems it's too theoretical for their own practical uses and they don't seem to be able to adapt to that. That's about as close as I can...

VR [26:07]: You've had a great 40 year career. If you look back at it and you think of what are the main contributions you've made and what's been your greatest satisfaction, your greatest personal satisfaction?

BC: My greatest personal satisfaction is that when first asked to be in the Continuum and my association with that. That was by far the most intellectually stimulating piece of work and bunch of people to be associated with. Ever. I like to think that in the radioecology field--and this may come out of the little sour grapes--because I've always felt that the field of radioecology in general is been underestimated and underused by ecologists. The hey day of that field was probably from the late '40s till the late '60s. But there were four symposia produced. There was a ton of neat ecological work done with radionucleis, but to me it was largely ignored by pure ecologists as being, "Oh they're just looking at contamination and major numbers." But I think if you dig back into the contributions that that field made to this rite I'm saying to sum up my satisfaction and I think I did good work. Some of that tracing and uptake of the different things like zinc 65, by macrophytes and some things like this. This was important stuff and I think it was good stuff, but I just don't think it was ever picked up and realized by the rest of the ecological community. But I was satisfied doing with it what I did with it. I'm perfectly happy with it, so I guess that's all I can say.

VR [28:03]: Thank you very very much.